



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/577,808

04/28/2006

Goshiki Keigo

F260

8045

34440

7590

07/30/2008

COLLEN IP

THE HOLYOKE MANHATTAN BUILDING

80 SOUTH HIGHLAND AVENUE

OSSINING, NY 10562

EXAMINER

NGUYEN, VU ANH

ART UNIT

PAPER NUMBER

4171

MAIL DATE

DELIVERY MODE

07/30/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/577,808	Applicant(s) KEIGO, GOSHIKI	
	Examiner Vu Nguyen	Art Unit 4171	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 6 recites the limitation "the fluororesin in which terminal groups are stabilized" in claims 3 and 4. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1 and 2 are rejected under 35 U.S.C. 102(b) as being anticipated by Miyagawa (JP 2003/192914A).
5. Regarding claims 1 and 2, claim 1 recites a fluororesin composition comprising a fluororesin having terminal groups stabilized, and carbon nanotubes. Claim 2 specifies the fluororesin to be a perfluoroalkoxyalkane polymer or a perfluoroethylene propylene copolymer.
6. Miyagawa teaches a composition comprising a fluororesin and carbon nanotubes [0005]. The fluororesin includes a tetrafluoroethylene-hexafluoropropylene copolymer

Art Unit: 1796

[0006]. The prior art is silent as to the stabilization of the terminal groups of the fluoro-resin. However, since the applicants define “stabilized terminal groups” as terminal groups absent of such groups as amide, carbinol, carboxy groups and the like, and since the prior art makes no mention of these groups as well as being concerned with a fluoro-resin that is acid-resistant [0003 & 0006], the disclosed fluoro-resin apparently has stabilized terminal groups. [The examiner notes that a method of synthesis of perfluoroalkyl-terminated perfluoroethylene-propylene copolymer using difluoroacetyl peroxide as a radical initiator (which decomposes into a fluoroalkyl radical) is disclosed by Noda et al. (U.S. 5,399,643)].

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miyagawa (JP 2003/192914A) in view of Nishikawa et al. (JP 2000/281855A).

10. Claim 3 recites a fluoro-resin composition comprising a blend of a fluoro-resin and carbon nanotubes wherein the carbon nanotubes are surface-treated with a fluorine-based surfactant.

11. Miyagawa teaches a composition comprising a fluoro-resin and carbon nanotubes as mentioned above, but fails to teach surface-treated carbon nanotubes.

12. Nishikawa et al. (Nishikawa, hereafter) teaches a composition comprising a fluoro-resin which is perfluoroethylene propylene copolymer [0007] and a carbon-based electrically conductive filler that includes graphite [0009]. The filler is surface-treated with a fluorine-containing compound [0012]. Nishikawa further teaches that

[Motivation] if the filler is not surface-treated with a fluoroalkyl compound or if it is surface-treated with a fluorine-free compound, the dispersibility of the filler will be inferior [0012] and the conductivity of the composition will be negatively impacted from fluctuation of resistance [0001].

13. In light of such benefits and since carbon nanotubes are a species of the genus carbon-based electrically conductive fillers taught by Nishikawa, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the composition taught by Miyagawa by subjecting the carbon nanotubes to surface treatment with a fluorine-based surfactant to improve the dispersibility of the carbon nanotubes in the fluoro-resin matrix and thereby enhance the conductivity of the composition. [The examiner notes that the fluoroalkyl compounds taught by Nishikawa

Art Unit: 1796

read on the definition of surfactant since they are used to disperse (i.e., lower the surface tension of) a carbon filler in a polymer matrix].

14. Claims 4-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyagawa (JP 2003/192914A) in view of Nishikawa et al. (JP 2000/281855A), Barraza et al. (WO 2004/001107), and Khan et al. (U.S. 4,469,846).

15. Regarding claims 4-6, claim 4 specifies the fluorine-based surfactant in claim 3 to be a fluoroalkylcarboxylic acid, a fluoroalkylsulfonic acid, or their salts. Claim 5 depends on claim 3 or 4 and specifies the fluororesin to have stabilized terminal groups. Claim 6 depends on claim 3 or 4 or 5 and specifies the fluororesin as recited in claim 5 to be a perfluoroalkoxyalkane polymer or a perfluoroethylene propylene copolymer.

16. Corresponding to the limitations set forth in these claims, Miyagawa teaches, as mentioned above, a composition comprising a fluororesin and carbon nanotubes. The fluororesin includes a tetrafluoroethylene-hexafluoropropylene copolymer. The obvious reasons for one skilled in the art to modify the disclosed composition by surface-treatment of the carbon nanotubes with fluoroalkyl compounds as taught by Nishikawa are discussed above. However, neither Miyagawa nor Nishikawa teaches the surfactants recited in claims 4-6.

17. Barraza et al. (Barraza, hereafter) teaches a carbon nanotube-filled composite comprising the steps of dispersing the carbon nanotubes with a surfactant in an aqueous medium, adding polymerizable monomers, adding initiator, and conducting polymerization (Claim 1). The monomers include styrene and the surfactants include

Art Unit: 1796

sodium dodecyl sulfate, sodium dodecylbenzene sulfonate, and others (Claim 9).

Barraza is concerned with the question of how to adequately disperse carbon nanotubes in a polymer matrix without destroying their integrity [0002] and the disclosed method enables the carbon nanotubes to be highly dispersed in the polymer matrix [0004].

18. Khan et al. (Khan, hereafter) teaches core/shell fluoropolymer compositions wherein both the core and the shell are made of fluorinated monomers (col. 2, lines 19-30). The core comprises a homopolymer of tetrafluoroethylene synthesized in aqueous emulsion using emulsifying agents that include perfluoroalkylcarboxylic acid, fluoroalkylsulfonic acid, or there salts (col. 2, lines 56-67). The core/shell fluoropolymer compositions are used as fillers for fluoroelastomers, together with other conventional fillers, to impart improved tear strength and other physical properties (col. 4, lines 66-68; col. 5, lines 1-20; Abstract).

19. The examiner notes that, as taught by Nishikawa and Barraza, carbon nanotubes can be dispersed with either a nonionic surfactant or an ionic surfactant, depending on the chosen methods (e.g., non-aqueous or aqueous medium). It is also noted that anionic surfactants such as alkylsulfonic acid, alkylcarboxylic acid, and their salts are well known surfactants used for dispersing a hydrophobic component, which can be carbon nanotubes as disclosed by Barraza, in an aqueous medium. Further, one skilled in the art would know that "like dissolves like". In other words, one would want to blend a fluorinated component in a fluorinated matrix (as in the cases of Nishikawa and Khan)

Art Unit: 1796

and a non-fluorinated component in a non-fluorinated matrix (as in the case of Barraza); otherwise, the blends will be unstable due to phase separation.

20. For the aforesaid reasons and in light of the teachings by Barraza that anionic surfactants such as alkylsulfonate salts are highly suitable for dispersing carbon nanotubes, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to employ fluoroalkylcarboxylic acid, fluoroalkylsulfonic acid, or their salts as surfactants for dispersing carbon nanotubes (in aqueous medium) and incorporating the so-dispersed carbon nanotubes in a fluorinated polymer matrix to achieve more uniform dispersion of the filler in the fluororesin with minimum phase separation and thereby improve the performance of the composition.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Vu Nguyen whose telephone number is (571)270-5454. The examiner can normally be reached on M-F 7:30-5:00 (Alternating Fridays).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, D. Lawrence Tarazano can be reached on 571-272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1796

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Ling-Siu Choi/
Primary Examiner, Art Unit 1796

Vu Nguyen
Examiner
Art Unit 4171